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MOUTHWASH GOLD STANDARDS VERSUS MICROBIOLOGICAL ANALYSIS

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ABSTRACT

Over advanced dental cosmetic awareness, the commercially competent mouthwash and suppressed importance of the active ingredients have lead to increased dental trauma. In view of this, antimicrobial efficacy of oradex, oral B and listerine mouthwash were tested against the confirmed isolates of *Bacillus cereus*, *Candida albicans*, *Lactobacillus* spp., *Lactobacillus buchneri*, *Sarcina* spp., *Staphylococcus* spp., *Staphylococcus epidermidis*, *Streptococcus* spp., *Streptococcus mitis* and *Streptococcus pneumoniae* obtained from pre and post mouth wash rinse. Antimicrobial susceptibility test was performed according to CLSI (2015). Oradex mouthwash exhibited significant inhibition against all confirmed isolates, oral B mouthwash recorded similar results except against *Streptococcus* spp and cool mint listerine exhibited no inhibition. One-way ANOVA test proved there are variations in the effects exhibited by the three test mouthwash ($p < 0.05$). Pharmaceutical formulations, microbiological analysis and periodic education will mark the development of mouthwash quality that are safe and effective to use across all age groups.

KEYWORDS: Oral B, oradex, listerine, mouthwash, oral infection.

INTRODUCTION

Terminologies supersede the actual cause and effect of the clinical condition. Dental syndromes are no exceptions. From hominids to modern humans, tooth decay, gum disease

has been plaguing dental complaint.[1] Cariogenic bacteria have dominated the reports, despite the exhaustive studies about the mechanisms of oral microbial flora. [2-9] Mouthwash solutions have demonstrated oral hygiene by reducing dental plaque formation that limits gingivitis and periodontitis.[10-12] Periodic evaluation of oral antimicrobial formulations aid in clinical activity verification.[13-17] Long term use of mouthwash may contribute to the development of multidrug resistance.[18-19] Scientific literature does not reflect the microbiological quality assessment of mouthwash by the respective manufactures.[20-23] In view of this, microbiological analysis of the selected mouthwash was conducted.

MATERIALS AND METHODS

Bacterial and Fungal Isolates

Confirmed isolates were collected form Infection control practitioner.

Pre Mouth Rinse Isolates

Bacillus cereus, Candida albicans, Lactobacillus spp., *Sarcina* spp., *Staphylococcus* spp., *Staphylococcus epidermidis, Streptococcus* spp., *Streptococcus pneumoniae*.

Post Mouth Rinse Isolates

Lactobacillus buchneri and *Streptococcus mitis.*

Mouthwash

Three brands of mouthwash were used in the study *viz*., oradex, oral B and cool mouth listerine which were purchased from Guardian, a pharmaceutical outlet in section 23, Selangor. Malaysia.

Kirby – Bauer Disc Diffusion Test

Confirmed bacterial and fungal isolates were subjected to disc diffusion assay (CLSI 2015). The experiment was performed in triplicates and the mean average values were recorded. Ampicillin and fluconazole served as positive control for confirmed bacterial and fungal isolates respectively.

RESULTS

Figure 1 shows oradex mouthwash exhibited significant inhibition zones against all the isolates. Oral B mouthwash also showed significant inhibitory effect except against *Streptococcus* spp. In addition, the antimicrobial activity of oral B mouthwash recorded was

on a higher mark compared to oradex against *Bacillus cereus*, *Lactobacillus* spp., *Lactobacillus buchneri* and *Streptococcus mitis*. Cool mint listerine was ineffective in microbial growth inhibition. One-way ANOVA test proved there are variations in the effects exhibited by the three test mouthwash ($p < 0.05$) as indicated in Table 1.

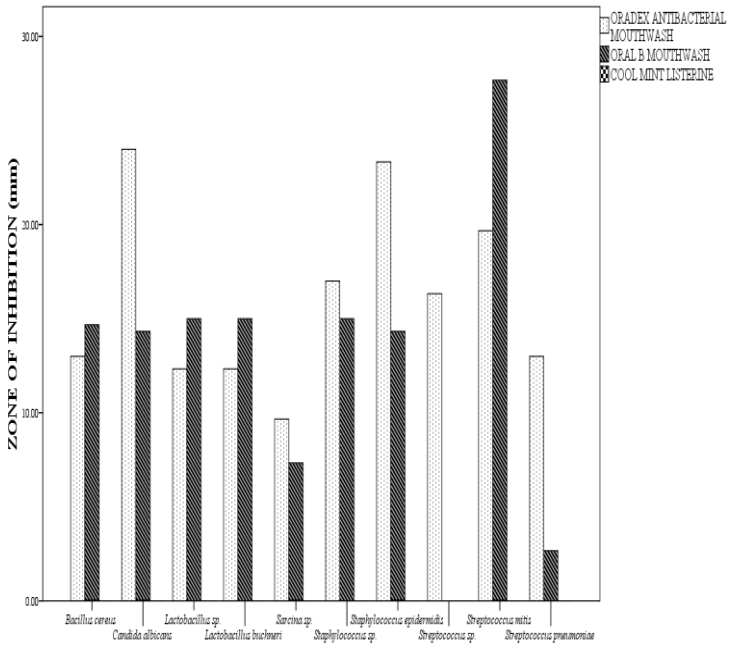

Figure 1: Kirby-Bauer Disc Diffusion Test

Table 1: One-way ANOVA test analysis of Kirby-Bauer disc diffusion test

Confirmed Isolates		Sum of Squares	df	Mean Square	F	Sig.
Bacillus cereus	Between Groups	386.889	2	193.444	435.250	.000
	Within Groups	2.667	6	.444		
	Total	389.556	8			
Candida albicans	Between Groups	874.889	2	437.444	984.250	.000
	Within Groups	2.667	6	.444		
	Total	877.556	8			
Lactobacillus spp.	Between Groups	384.222	2	192.111	432.250	.000
	Within Groups	2.667	6	.444		
	Total	386.889	8			
Lactobacillus buchneri	Between Groups	384.222	2	192.111	432.250	.000
	Within Groups	2.667	6	.444		
	Total	386.889	8			
Sarcina spp.	Between Groups	152.667	2	76.333	137.400	.000
	Within Groups	3.333	6	.556		
	Total	156.000	8			
Staphylococcus spp.	Between Groups	518.000	2	259.000	155.400	.000
	Within Groups	10.000	6	1.667		
	Total	528.000	8			

Staphylococcus epidermidis	Between Groups	830.889	2	415.444	48.558	.000
	Within Groups	51.333	6	8.556		
	Total	882.222	8			
Streptococcus spp.	Between Groups	773.556	2	386.778	217.562	.000
	Within Groups	10.667	6	1.778		
	Total	784.222	8			
Streptococcus mitis	Between Groups	1216.222	2	608.111	68.413	.000
	Within Groups	53.333	6	8.889		
	Total	1269.556	8			
Streptococcus pneumoniae	Between Groups	282.889	2	141.444	19.891	.002
	Within Groups	42.667	6	7.111		
	Total	325.556	8			

DISCUSSION

Three selected mouthwash efficacy was evaluated microbiologically. Oradex antibacterial mouthwash was proven to be much effective in suppressing microbial growth is in accordance with other reports.[25-31] Oral B mouthwash exhibited a considerable antimicrobial activity but was not as effective as oradex antibacterial mouthwash is in agreement with other studies.[32] Similar results were recorded with oral B mouthwash except against *Streptococcus* spp is in contrast with other reports.[33] Cool mint listerine exhibited negligible efficacy which is in conformity with other study.[34] However, reports claim the combination of active ingredients of oradex and cool mint listerine mouthwash against oral pathogens have significant efficacy.[35] One-way ANOVA test recorded variations in the effects exhibited by the three test mouthwash ($p < 0.05$) with mixed results indicated in other studies.[36-37]

The continued emphasis is due to the reports that demonstrated cytogenetic damage induced by some mouthwash formulations.[38-39]

CONCLUSION

Labels of gold standard claims are no claims in microbiological perspective. Periodic over all real time analysis will help in efficacy transparency and invigorate product validity.

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We do not have any conflicts of interest to declare.

REFERENCES

1. Selwitz RH. Dental caries. Lancet, Retrieved, 1 October 2013.
2. Loesche WJ. Role of *Streptococcus mutans* in human dental decay. Microbiol Rev., 1986; 50: 353-380.
3. Palmer RJ, Rickard AH, Jakubovics NS. Bacterial interactions and successions during plaque development. Periodontol, 2000; 42: 47-79.
4. Li YH, Lau PCY, Lee JH, Ellen RP. Natural genetic transformation of *Streptococcus mutans* growing in biofilms. J. Bacteriol, 2001; 183(3): 897-908.
5. Hughes FJ, Mc Nab R. Oral mal odour-a review. Arch Oral Biol, 2008; 5: S1-7.
6. Brook I. Microbiology and management of periodontal infections. Gen Dent, 2003; 51(5): 424-428.
7. Sullivan R, Santarpia P, Lavender S, Gittins E, Liu Z, Anderson MH, He J. Clinical efficacy of a specifically targeted antimicrobial peptide mouth rinse: targeted elimination of *Streptococcus mutans* and prevention of demineralization. Caries Res., 2011; 45(5): 415-428.
8. Abbott PV, Salgado JC. Strategies for the endodontic management of concurrent endodontic and periodontal diseases. Aust Dent J., 2009; 54: S70-85.
9. Pires JR, Rossa Junior C, Pizzolitto AC. *In vitro* anti- microbial efficiency of a mouthwash containing triclosan/gantrez and sodium bicarbonate. Braz Oral Res., 2007; 21(4): 342-347.
10. Andrade AR, Machon L, Chavez N. Effectiveness of a mouthwash containing Triclosan and Gantrez in the reduction of biofilm and gingivitis: a clinical pilot study. J Contemp Dent Pract, 2009; 10(6): 033-040.
11. Haffajee AD, Yaskell T, Socransky SS. Antimicrobial effectiveness of an herbal mouth rinse compared with an essential oil and a chlorhexidine mouth rinse. J Am Dent Assoc, 2008; 139(5): 606-611.
12. Williams MI. The antibacterial and antiplaque effectiveness of mouthwashes containing cetylpyridinium chloride with and without alcohol in improving gingival health. J Clin Dent, 2011; 22(6): 179-182.
13. Manupati P. Antimicrobial efficacy of different toothpastes and mouth rinses: An *in vitro* study. Dent Res., 2011; 8(2): 85-94.
14. Gunsolley JC. A meta-analysis of six-month studies of antiplaque and anti gingivitis

agents. J Am Dent Assoc, 2006; 137: 1649–57.

15. Haps S, Slot D, Berchier C, Van der Weijden G. The effect of cetylpyridinium chloridecontaining mouth rinses as adjuncts to tooth brushing on plaque and parameters of gingival inflammation: a systematic review. Int J Dent Hyg, 2008; 6: 290–303.
16. Stoeken JE, Paraskevas S, Van Der Weijden GA. The long term effect of a mouth rinse containing essential oils on dental plaque and gingivitis: a systematic review. J Periodontol, 2007; 78: 1218–28.
17. Webber MA, Whitehead RN, Mount M, Loman NJ, Pallen MJ, Piddock LJ. Parallel evolutionary pathways to antibiotic resistance selected by biocide exposure. J Anti microb Chemother, 2015; 70: 2241–8.
18. Giuliano CA, Rybak MJ. Efficacy of triclosan as an antimicrobial hand soap and its potential impact on antimicrobial resistance: a focused review. Pharmacotherapy, 2015; 35: 328–36.
19. Oluremi BB, Osungunna MO, Idowu OA, Adebolu O. Evaluation of anti caries activity of selected mouthwash marketed in Nigeria. Trop J Pharm Res., 2010; 9(6): 581-6.
20. Pan PC, Harper S, Ricci-Nittel D, Lux R, Shi W. *In-vitro* evidence for efficacy of antimicrobial mouth rinses. J Dent, 2010; 38: 16-20.
21. Malic S, Emanuel C, Lewis MAO, Williams DW. Antimicrobial activity of novel mouth rinses against planktonic cells and biofilms of pathogenic microorganisms. Microbiol Discov, 2013; 10. 7243/2052-6180-1-11.
22. Prasanth M. Antimicrobial efficacy of different toothpastes and mouth rinses: an *in vitro* study. Dent Res J (Isfahan), 2011; 8(2): 85-94.
23. Aneja KR, Joshi R, Sharma C. The antimicrobial potential of ten often used mouthwashes against four dental caries pathogens. Jundishapur J Microbiol, 2010; 3(1): 15-27.
24. Clinical and Laboratory Standards Institute: Performance standards for antimicrobial susceptibility testing. Twenty-fifth informational supplement, CLSI document M100-S25. PA, USA: Wayne, 2015.
25. Gehlen I, Netuschil L, Berg R, Reich E, Katsaros C. The influence of a 0.2% chlorhexidine mouth rinse on plaque regrowth in orthodontic patients. A randomized prospective study. Part I: clinical parameters. J Orofac Orthop, 2000; 61: 54–62.
26. Spets-Happonen S, Markkanen H, Pollanen L, Kauppinen T, Luoma H. Salivary *Streptococcus mutans* count and gingivitis in children after rinsing with a chlorhexidine fluoride solution with and without strontium. Scand J Dent Res., 1985; 93(4): 329–35.

27. Hefti AF, Huber B. The effect on early plaque formation, gingivitis and salivary bacterial counts of mouthwashes containing hexetidine/zinc, amine fluoride/tin or chlorhexidine. J Clin Periodontol, 1987; 14(9): 515–8.
28. Amornchat C, Kraivaphan P, Dhanabhumi C, Tandhachoon K, Trirattana T, Choonhareongdej S. Effect of Chaem Thai mouthwash on salivary levels of *mutans streptococci* and total IgA. Southeast Asian J Trop Med Public Health, 2006; 37(3): 528–31.
29. Hugoson A, Koch G, Johansson S. Consensus Klorhexidin inom tandvården. Swedish: Lic Forlag, Solna, 1990; 123.
30. Sheen S, Owens J, Addy M. The effect of toothpaste on the propensity of chlorhexidine and cetylpyridinium chloride to produce staining *in vitro*: a possible predictor of inactivation. J Clin Periodontol, 2001; 28(1): 46–51.
31. Jenkins S, Addy M, New combe RG. Dose response of chlorhexidine against plaque and comparison with triclosan. J Clin Periodontol, 1994; 21(4): 250–5.
32. Majed M, Masadeh, Shadi F, Gharaibeh, Karen H, Alzoubi, Sayer I, Al- Azzam, Wasfi M, Obeidat, Antimicrobial activity of common mouthwash solutions on multidrug resistance resistance biofilms. J Clin Med Res., 2014; 5(5): 389-394.
33. Janan G, Afagh M, Fatemeh L, Mahmood S. The antibacterial effect of four mouthwashes against *Streptococcus mutans* and *Escherichia coli*. J Pak Med Assoc, 2015; 65(4): 350-353.
34. Kamal RA, Radhika J, Chetan S. The antimicrobial potential of ten often used mouthwashes against four dental caries pathogens. Jundishapur Journal of Microbiology, 2010; 3(1): 15-27.
35. Amal SO. *In vitro* evaluation of six different mouthwashes against six oral pathogens. International Journal of Drug Delivery, 2015; 7: 44-51.
36. Hojatollah Y, Mansour A, Maryam R, Hamed G, Masumeh O. Comparison of the antibacterial properties of three mouthwashes containing chlorhexidine against oral microbial plaques: An *in vitro* study. Jundishapur J Microbiol, 2015; 8(2): e17341.
37. Evandro W, Andresa PN, Juliane M, Guerreiro T, Ana MR, Denise A, Mario TF. Antiseptic mouthwashes: *In vitro* antibacterial activity. Acta Odontol Latinoam, 2015; 28: 180-184.
38. Carlin V, Matsumoto MA, Saraiva PP, Artioli A, Oshima CT, Ribeiro DA. Cytogenetic damage induced by mouthrinses formulations *in vivo* and *in vitro*. Clin Oral Investig, 2012; 16: 813-820.

39. Rodrigues F, Lehmann M, do Amaral VS, Reguly ML, Andrade HH. Genotoxicity of three mouthwash products, Cepacol, Periogard, and Plax, in the Drosophila wing-spot test. Environ Mol Mutagen, 2007; 48: 644-649.